PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

Application No.	:	10/539,799
Confirmation	:	4929
Applicant	:	Torsten Pechstein and Robert Scholz
Filed	:	June 20, 2005
Title	:	Semiconductor sensor with front-side contacting
TC/A.U.	:	1797
Examiner	:	D. P. Kwak
Docket No.	:	PECH3004/FJD
Customer No.	:	23364

BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22202-3514

Sir:

INTRODUCTORY COMMENTS

Pursuant to the provisions of 37 CFR 41.37, submitted herewith is Applicant/Appellant's Brief on Appeal along with the required fee.

Any additional fees necessary for this appeal may be charged to the undersigned's Deposit Account No. 02-0200.

REAL PARTY IN INTEREST

(37 CFR 41.37(c)(1)(i)

The real party in interest is Applicant/Appellant's assignee Endress + Hauser Conducta Gesellschaft Fur Mess -u. Regeltechnik mbH + Co. KG. The assignment was recorded on February 15, 2006 at Reel 017261and Frame 0068.

RELATED APPEALS AND INTERFERENCES

(37 CFR 41.37(c)(1)(ii)

There are no related appeals or interferences with respect to the invention

defined in this application.

STATUS OF CLAIMS

(37 CFR 41.37(c)(1)(iii))

Claims 1 - 17 are pending in this application.

Claims 1 - 7, 9 and 10 have been withdrawn as non-elected.

Claims 8 and 11 - 17 have been finally rejected, and are therefore the claims that are being considered on this appeal.

STATUS OF AMENDMENTS

(37 CFR 41.37(c)(1)(iv))

A Request for Reconsideration with Amendment was filed after issuance of the Office Action of May 15, 2009. The amendment was directed to the abstract and not the claims.

An Advisory Action was issued on September 30, 2009 indicating that the "proposed amendment" would be entered , but that claims 8 and 11 - 17 were still finally rejected. As noted above, the amendment was to the abstract. Presumably, the issue surrounding the abstract has been resolved. In the advisory Action, the examiner provided Applicant/Appellant with a comment regarding the term "embedded."

SUMMARY OF CLAIMED SUBJECT MATTER

(37 CFR 41.37 (c)(1)(v))

(References are to page and line of the specification)

The invention being considered in this appeal relates to a semiconductor sensor which includes an ion-sensitive, field effect transistor (page 1, lines 4 - 6). The sensor has a semiconductor chip having a first surface, which has a media sensitive region and at least one, first, electrical contact surface. It also has a support having a second surface, which faces the first surface of the

semiconductor chip. An opening is aligned with the sensitive region. And at least one, second electrical contact surface, which overlaps, or aligns, with the at least one, first, electrical contact surface. Between the support and the semiconductor chip, a preferably elastic, anisotropic conductor is arranged, which produces a conducting connection between the at least one, first, contact surface and the at least one, second, contact surface. The film or layer has a traversing opening aligned with the opening in the second surface, so that the sensitive region of the semiconductor chip can be contacted through the opening with an analyte. The preferably elastic, anisotropic conductor seals the region outside of the opening against contamination with the analyte (page 2, lines 30 - 33 to page 3, lines 1 - 10).

The invention is defined by claims 8 and 11 - 17, with claims 8 and 15 being in independent form.

8. A sensor arrangement (Figs. 1 - 3), comprising:

a semiconductor chip having a first surface, which a media-sensitive region and at least one, first, electrical contact surface (page 2, lines 30 - 32);

a support having a second surface, which faces said first surface of said semiconductor chip, has an opening, which at least overlaps with said media sensitive region, and at least one, second, electrical contact surface, which at least overlaps with said at least one, first, electrical contact surface (page 2, line 32 to page 3, line 2); and

a sealing element, which is clamped between said support and said semiconductor chip and produces an electrically conducting connection between said at least one, first, contact surface and said at least one, second, contact surface, and which has a traversing opening, which at least overlaps with the opening in said second surface, so that media-sensitive region of said semiconductor opening is contactable through said opening with an analyte (page 3, lines 3 - 8), wherein:

said sealing element is elastic and seals the region outside of said opening against contamination with the analyte (page 3, lines 9 - 10); and

said elastic sealing element comprises an elastic, insulating, organic layer with a plurality of embedded, conductive particles, grains or filaments (page 3, lines 12 - 13).

15. A sensor arrangement (Figs. 1 - 3) comprising:

a semiconductor chip having a first surface, which has a media-sensitive region and at least one, first, electrical contact surface (page 2, lines 30 - 32);

a support having a second surface, which faces said first surface of said semiconductor chip, has an opening, which at least overlaps with said media-sensitive region, and at least one, second, electrical contact surface, which at least overlaps with said at least one, first, electrical contact surface (page 2, line 33 to page 3, line 2) ;and

an anisotropic conductor, which is arranged between said support and said semiconductor chip and produces an electrically conducting connection between said at least one, first, contact surface and said at least one, second, contact surface, and which has a traversing opening, which at least overlaps with the opening in said second surface, so that said media-sensitive region of said semiconductor opening is contactable through said opening with an analyte (page 3, lines 3 - 8), wherein:

said anisotropic conductor seals the region outside of said opening against contamination with the analyte (page 3 lines 9 and 10);

said anisotropic conductor is elastic(page 3, line 12); and

said elastic anisotropic conductor comprises a silicone layer with embedded gold filaments, which extend perpendicular to the plane of the silicone layer (page 3, lines 13 - 17).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(37 CFR 41.37(c)(1)(vi))

There are two issued in this appeal: (1) The rejection of claims 8 and 12 under 35 USC 102(b) by Najafi et al.; and (2) the rejection of claims 11 and 13-17 under 35 USC 103(a) by Najafi et al., in view of Baxter et al.

ARGUMENTS

(37 CFR 41.37(c)(1)(vii))

(1)

The first issue involving the rejection of claims 8 and 12 under 35 USC 102(b) by Najafi et al was during prosecution, and is now in this appeal, respectfully traversed.

It is well settled law, that for a single reference to anticipate (35 USC 102) a claim in a patent application, that single reference must include in its disclosure each and every positively recited structural element (apparatus) or step (method) in the claim, ***In re Bond***, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990) as an example only.

Of the two claims rejected under 35 USC 102, claim 8 is in independent form. It relates to a sensor arrangement having three components: a semiconductor chip; a support; and a sealing element. The sealing element is clamped between the support and the semiconductor chip. The sealing element is elastic, insulating, organic layer which seals the region outside of the opening formed in the support against contamination with an analyte. The sealing element includes a plurality of embedded conductive particles, grains or filaments. In his final rejection the examiner refers us to col. 6, line 38 and col. 6, lines 46 - 51 of Najafi et al for a teaching of the embedded constituents. It is respectfully submitted that this portion of Najafi et al does not equal the constituents claimed.

First of all, the Examiner stretches the teaching of Najafi et al very far, by interpreting the disclosure "mounting the sensor chip on a substrate using various interconnect materials and methods (e.g. fluxless solder bumps, conductive polymers)" (col. 6, l. 37-39) and "an underfill material is then applied to encapsulate the bonding pads" (col. 6, l. 46-47) to disclose "an elastic sealing element comprising an elastic insulating organic layer with a plurality of embedded conductive particles, grains or filaments". A solder bump is not a conductive particle, grain or filament. Even if the connection was made with conductive polymers, this would not disclose filaments as suggested in the Office Action on page 3, last point. Nowhere in Najafi et al can any disclosure concerning the structure of a connection made by conductive polymers be found. In particular, it does not disclose that a connection between the sensor chip and the substrate made by conductive polymers would have a filament structure or would be an anisotropic conductor.

Furthermore, the Examiner does not recite the claim language of amended claim 8 correctly on page 3 of the Office Action. Point 5 of page 3 of the Office Action reads "a sealing element (...), which is arranged between said support and said semiconductor chip ...". However, amended claim 8 reads "a sealing element, which is clamped between said support and said semiconductor chip".

Najafi et al, however, does not disclose a sealing element comprising an elastic insulating organic layer with a plurality of embedded conductive particles, grains or filaments that is clamped between a support and a semiconductor chip. In Najafi et al the substrate and the chip are connected with solder bumps encapsulated by an underfill material that is applied in a liquid state and cured at a cure temperature (col. 6, l. 47-51).

On page 4, last paragraph of the Office Action, the examiner states that the feature "clamping of said elastic insulating organic layer ..." does not further

limit an apparatus claim, because ".....the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim", citing MPEP §§ 2114 and 2115 and ***Ex parte Thibault***, 164 USPQ 666, 667 (Bd. App. 1969). Here, however, there is a structural difference: on the one hand there is a chip connected to a substrate by solder bumps enclosed by an underfill material. On the other hand, a sealing element with embedded particles, grains or filaments is clamped between a chip and a substrate. Soldering and clamping are clearly to different kinds of methods for connecting a substrate and a chip. Consequently, the feature that the sealing element is clamped between the sensor chip and the substrate is clearly a structural limitation. MPEP §§ 2114 and 2115 is not applicable here, nor is ***Ex parte Thibault***, which looked into "intended operation." How can structural elements be viewed as "intended operations?" Clearly, they cannot

The Najafi et al reference necessarily fails the single reference test, and cannot, therefore, anticipate claim 8, and claim 12, which depends therefrom.

(2)

With respect to independent claim 15, the Examiner agrees that Najafi et al fails to disclose the material being a silicon layer with embedded gold filaments. Baxter et al fails to disclose a silicon substrate with gold filaments either. In col. 2, l. 61-63, Baxter et al discloses "an alternative would be to deposit a film comprised of a noble metal such as gold or platinum for the contact". The film should be used as a low impedance contact to the liquid being sampled, coupled to the ISFET (col. 2, l. 33-36). First, a film is clearly not a filament. Furthermore, the film according to Baxter et al is not used to make an electrical connection between the sensor chip and the substrate but to provide low impedance contact to the liquid and the ISFET. This structure disclosed by Baxtor et al has nothing to do with the embedded gold filaments of the invention or with the solder

connections enclosed by an underfill material according to the Najafi et al reference. Consequently, there is neither a motivation to combine the Najafi et al reference and the Baxter et al reference, nor would such a combination lead in any way to the sensor arrangement according to claim 15.

The Examiner cites two "evidential references", Cheng et al (US 6,579,106) and Westwater et al (US 5,858,862) in order to show "that it is well known in the art of electrical connecting structures to combine silicon layer with gold filaments". However, Cheng et al disclose a conductive member disposed between a circuit board and a second circuit board having gold-plated filaments 224 formed thereon (col. 3, l. 44-47 and col. 4, l. 4-6, Fig. 3). These gold-plated filaments are not embedded, because they are formed on the surface of the silicon. Westwater et al disclose a method to allow silicon quantum fine wires to grow in particular forms (cf. abstract l. 10-11). Obviously both documents are no "evidential references" showing embedded gold filaments in a silicon layer.

As far as what "embedded" means, it does not mean "joining" as one would find with soldering. Embedded means "enclosed firmly in a surrounding mass," see the attached definition from Google in the EVIDENCE APPENDIX. The references cited do not teach "embedded" as used here.

CONCLUSION

A sensor arrangement with an improved sealing element with embedded structure which is clamped between a support or substrate and a semiconductor chip and which seals a region around an opening in the support, and which produces an electrically conducting connection between a first contact on the semiconductor chip and a second contact on the support is not taught with the degree of specificity require

by either 35 USC 102 or 103.

In view of the above, therefore, it is respectfully submitted that the final rejections noted above should be reversed so that claims 8 and 11 - 17 can be allowed over the references of record and those applied.

Respectfully submitted
BACON & THOMAS, PLLC

Date: February 16, 2010

Felix J. D'Ambrosio
Reg. No. 25,721

BACON & THOMAS, PLLC
625 Slaters Lane, 4th Floor
Alexandria, VA 22314
Tel: (703) 683-0500
Fax: (703) 683-1080
S:\Producer\fjd\CLIENTS\Endress+Hauser Holding GmbH\PECH3004-CD0179\Revised Brief on Appeal.wpd

APPENDIX OF CLAIMS

(37 CFR 41.37 (c)(1)(viii)

Claims 1 - 7 (Cancelled).

8. A sensor arrangement, comprising:

a semiconductor chip having a first surface, which has a media-sensitive region and at least one, first, electrical contact surface;

a support having a second surface, which faces said first surface of said semiconductor chip, has an opening, which at least overlaps with said media-sensitive region, and at least one, second, electrical contact surface, which at least overlaps with said at least one, first, electrical contact surface; and

a sealing element, which is clamped between said support and said semiconductor chip and produces an electrically conducting connection between said at least one, first, contact surface and said at least one, second, contact surface, and which has a traversing opening, which at least overlaps with the opening in said second surface, so that said media-sensitive region of said semiconductor opening is contactable through said opening with an analyte, wherein:

said sealing element is elastic and seals the region outside of said opening against contamination with the analyte; and

said elastic sealing element comprises an elastic, insulating, organic layer with a plurality of embedded, conductive particles, grains or filaments.

Claims 9 and 10 (Cancelled).

11. The sensor arrangement as claimed in claim 8, wherein:

said elastic, sealing element comprises a silicone layer with embedded gold filaments, which extend perpendicular to the plane of the silicone layer.

12. The sensor arrangement as claimed in claim 8, wherein:

said elastic insulating organic layer includes embedded, metal grains in the relaxed state in a concentration such that the number of electrical contacts between the grains is insufficient to produce a continuous electrical conductivity; and

by clamping of said elastic insulating organic layer as a sealing element between said support and said semiconductor chip, said elastic insulating organic layer is compressed to a degree such that, in the direction of compression, a sufficient number of electrical contacts is present for producing a conducting connection between said at least one, first, contact surface and said at least one, second, contact surface.

13. The sensor arrangement as claimed in claim 8, wherein:

said semiconductor chip has an ion-sensitive region.

14. The sensor arrangement as claimed in claim 8, wherein:

said semiconductor chip is a pH sensor element or a redox sensor element.

15. A sensor arrangement comprising:

a semiconductor chip having a first surface, which has a media-sensitive region and at least one, first, electrical contact surface;

a support having a second surface, which faces said first surface of said semiconductor chip, has an opening, which at least overlaps with said media-sensitive region, and at least one, second, electrical contact surface, which at least overlaps with said at least one, first, electrical contact surface; and

an anisotropic conductor, which is arranged between said support and said semiconductor chip and produces an electrically conducting connection between said at least one, first, contact surface and said at least one, second, contact surface, and which has a traversing opening, which at least overlaps with the opening in said second surface, so that said media-sensitive region of said semiconductor opening is contactable through said opening with an analyte, wherein:

said anisotropic conductor seals the region outside of said opening against contamination with the analyte;

said anisotropic conductor is elastic; and

said elastic anisotropic conductor comprises a silicone layer with embedded gold filaments, which extend perpendicular to the plane of the silicone layer.

16. The sensor arrangement as claimed in claim 15, wherein:

said semiconductor chip has an ion-sensitive region.

17. The sensor arrangement as claimed in claim 15, wherein:

said semiconductor chip is a pH sensor element or a redox sensor element.

EVIDENCE APPENDIX

There is no evidence being relied upon which was submitted pursuant to 37 CFR 1.130, 1.131 or 1.132. The definition of embedded as found in Google is being submitted herewith.

Google define:Embedded Search Advanced Search Preferences

Web

Related phrases: embedded system embedded object embedded software embedded value embedded sql windows xp embedded windows embedded embedded linux embedded c++ embedded systems

Definitions of **Embedded** on the Web:

- enclosed firmly in a surrounding mass; "found pebbles embedded in the silt"; "stone containing many embedded fossils"; "peach and plum seeds ...
- inserted as an integral part of a surrounding whole; "confused by the embedded Latin quotations"; "an embedded subordinate clause"
  wordnetweb.princeton.edu/perl/webwn

- Embedded journalism refers to news reporters being attached to military units involved in armed conflicts. While the term could be applied to many historical interactions between journalists and military personnel, it first came to be used in the media coverage of the 2003 invasion of Iraq. ...
  en.wikipedia.org/wiki/Embedded_(journalism)

- Embedded is a play starring, written, and directed by Tim Robbins. It chronicles the war in Iraq through satire and commedia dell'arte masks. It also pokes fun at neo-conservatives such as Karl Rove, Condoleezza Rice, Dick Cheney, and Donald Rumsfeld.
  en.wikipedia.org/wiki/Embedded_(play)

- Embedded is the 3rd solo album by Mark Seymour, released in 2004.
  en.wikipedia.org/wiki/Embedded_(album)

- To be part of, and firmly, or securely surrounded; lodged solidly into; To be partially buried in concrete or planted in earth
  en.wiktionary.org/wiki/embedded

- embed - implant: fix or set securely or deeply; "He planted a knee in the back of his opponent"; "The dentist implanted a tooth in the gum"
- embed - attach to, as a journalist to a military unit when reporting on a war; "The young reporter was embedded with the Third Division"
  wordnetweb.princeton.edu/perl/webwn

- Embeddedness is the degree to which individuals are enmeshed in a social network. The concept was introduced by Mark Granovetter and popularized ...
  en.wikipedia.org/wiki/Embeddedness

- embeddedness - The property of being embedded
  en.wiktionary.org/wiki/embeddedness

- embed - To lay as in a bed; to lay in surrounding matter; to bed; as, to embed a thing in clay, mortar, or sand; To include in surrounding matter; To encapsulate within another document or data file (unrelated to the other computing meaning of embedded as in embedded system); To define a one-to-one ...
  en.wiktionary.org/wiki/embed

- embeddedness - A state in which one system is nested in another system.
  ovis.ui.ac.id/wiki/Glossary_of_systems_theory

- sunken deeply in a surrounding solid mass, as with sporophytes of Riccia and Ricciocarpos
www.life.illinois.edu/moss-guide/append-C-glossary.html

- embed - To become an integral part of something or to enclose closely.
www.yourwebassistant.net/glossary/e3.htm

- embeddedness - a measure of the amount of surface area of cobbles, boulders, snags & other stream bottom structures that is covered with sand and silt. An embedded streambed may be packed hard with sand and silt such that rocks in the stream bottom are difficult or impossible to pick up. ...
homepage.mac.com/avkurt/.Public/manual%20for%2008/NYSCTU%20Stream%20Assessment%20Manual%20Glossary.doc

Find definitions of **Embedded** in: Chinese (Simplified) Chinese (Traditional) Czech **English** French Italian Portuguese Romanian Russian Spanish all languages

---

define:Embedded Search

Language Tools - Search Help - Dissatisfied? Help us improve - Try Google Experimental

---

Google Home - Advertising Programs - Business Solutions - Privacy - About Google

RELATED PROCEEDINGS APPENDIX

There is no related proceeding being relied upon.

S:\Producer\fjd\CLIENTS\Endress+Hauser Holding GmbH\PECH3004-CD0179\Revised Brief on Appeal.wpd